

The Conservation of Total Energy

$$W_{nc} = E_f - E_i$$

Example 1: If $-3.40 \times 10^3 \text{ J}$ of work is done by friction between points A and B, determine the speed of the car at point B.



$$W_{nc} = E_f - E_i$$

$$-3.4 \times 10^3 \text{ J} = (E_k^{E_f} + E_g) - (E_k + E_g)$$

$$-3.4 \times 10^3 \text{ J} = \left(\frac{1}{2}mv^2 + mgh \right) - \left(\frac{1}{2}mv^2 + mgh \right)$$

$$-3.4 \times 10^3 \text{ J} = \left(\frac{1}{2}(200)v^2 + (200)(9.81)(6) \right) - \left(\frac{1}{2}(200)(4)^2 + (200)(9.81)(15) \right)$$

$$-3.4 \times 10^3 \text{ J} = \left(\frac{1}{2}200v^2 + 11772 \right) - (31030)$$

$$-3.4 \times 10^3 \text{ J} + 31030 = 100v^2 + 11772$$

$$27630 \text{ J} - 11772 = 100v^2$$

$$\sqrt{\frac{15858}{100}} = v^2 \quad v = 12.6 \text{ m/s}$$

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